PORTABLE LIGHT WEIGHT DESK ENABLING MULTIPLE USER POSITIONS

FIELD OF INVENTION

The present invention relates to portable and adjustable desks or support structures, and in particular, to a portable and adjustable desk or support structure permitting multiple user positions while supporting an object.

BACKGROUND OF INVENTION AND BRIEF DESCRIPTION OF THE PRIOR ART

Portable and/or foldable tables have existed to provide users with an easily foldable/unfoldable table structure that provides table surfaces for a wide variety of uses and purposes and convenience to the users. These tables may be typically used at places or locations where conventional tables cannot be used. Such tables are used for working, reading/writing, eating, or any other purposes. Common uses of such tables are for placing and supporting laptop or portable computers, books, plates, bowls, or any other such items.

For example, laptop or portable computers are used by various persons. Laptop computer users often prefer to use their portable computers while sitting in a comfortable chair/couch or while sitting up or lying in a bed. These locations, however, typically require a table or desk on which the computer is placed, or the user must position the computer on his or her lap.
Supporting a portable computer on the user's lap is awkward or uncomfortable and causes heat, sweat, muscle fatigue, etc. to the user. Therefore, portable computer users generally prefer to use some type of portable table, stand, support device, or other flat, rigid surface upon which the computer is placed.

U.S. Pat. Nos. 1,719,614; 2,449,492; 2,476,620; 3,805,710; 4,119,289; 4,726,556; 5,417,168; and 6,019,050 disclose examples of such portable and/or adjustable tables or support structures. However, there are various problems and disadvantages with these prior art portable tables or support structures. Some of these prior art tables and support structures are uncomfortable and bulky to use, cumbersome to set up, or not easily or variably adjustable to accommodate the different positions in which the user may use the table and support structures such as lying in bed, sitting at a conventional table or seated in a vehicle.

Some of the prior art tables and support structures required attachment or coupling to another surface or structure in order to be used. Portable tables and support structures that are collapsible and folding and self-supporting and self-standing have been developed and exist in the prior art. U.S. Pat. Nos. 2,476,620; 3,805,710; 4,726,55 6; 5,417,168 disclose examples of such self-supporting or self-standing, collapsible tables and support structures. However, one problem with these self -supporting,

collapsible prior art tables is that the legs or leg components are not able to be easily folded together since one leg or leg component would get in the way of rotation or folding of the other leg or leg component when the legs or leg components were being placed into a storage position. The folded legs were therefore bulky, or one of the legs needed to be removed in order to fold or place the legs in a compact position. Therefore, the need and desire exists to develop and provide a leg assembly for a table or support structure wherein the leg components stay coupled to the leg assembly and wherein the leg components are able to be put into a folding position and rotate or fold easily out of the way of each other when being folded to a compact storage position and are able to rotate back to an unfolding position for use.

Also, some of the prior art tables or support structures have foldable or collapsible legs or leg assemblies that may not be very stable or balanced when in use. Therefore, collapsible truss structures or collapsible triangular shaped leg components have been developed and used for various tables and support structures. U.S. Pat. Nos. 3,164,353 and 4,726,556 provide examples of such legs or leg assemblies. U.S. Pat. No. 3,164,353 is further incorporated by reference herein. However, one problem with these legs or leg assemblies is that the stability, balance, and center of gravity position of the table or support structure may become less stable as the table or support surface is raised or lowered to a various position. Therefore, the need and desire exists to develop and provide a leg assembly for a table or support structure wherein the legs or leg components and the center of gravity position of the leg assembly remain generally stable and balanced whether the table or support structure surface is raised or lower.

Furthermore, prior art tables or support structures that allow for height adjustment exist in order to accommodate the user. U.S. Pat. Nos. 2,449,492; 2,476,620; 3,805,710; 4,119,289; 4,726,556; 5,417,168 provide examples of such height adjustable tables or support structures. However, some of the prior art height adjustment mechanisms for these tables or support structures are cumbersome, awkward, or difficult to use. U.S. Pat. No. 5,417,168 discloses a height adjustment mechanism that uses an engaging protuberance to one of a number of height adjustment holes in order to adjust the height of each leg component. However, this height adjustment mechanism has the problem of aligning the engaging protuberance to a certain/desired height adjustment hole. Therefore, the need and desire exists to develop and provide a height adjustment mechanism for a table or support structure that is easily accessible and easy to use to adjust height of the table and able to easily align and engage the engaging protuberance into a certain/desired height adjustment hole.

A further limitation of the prior art tables or support structures is that they do not explicitly teach or disclose legs or leg components that are independently adjustable to conform the plane of the table or support struc ture surface to even and uneven surfaces (i.e. bed or mattress surface or any other such even/uneven surfaces). Another limitation of the prior art tables or support structures is that they do not adjust to the size and height of the user in that the width distance apart from the legs or leg

components are not adjustable when the height of the table or support structure surface is lowered or raised. Also, a mechanism for adjusting the angle or pitch of the table or support structure surface is in continual need of improvement and development.

Therefore, the present invention discloses and provides a portable and configurable desk top to enable multiple user positions that overcomes the above problems, disadvantages, and limitations of the prior art.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a light weight portable desk surface that is adjustable to enable multiple user positions while supporting an object such as a laptop computer or other electronic device or including a book or a food tray.
It is an object of this invention to provide a portable light weight desk surface that can easily be mounted with wheels.

The present invention is directed to a portable desk top frame structure for supporting an object comprising:

a plurality of lateral members;
a plurality of transverse members,
at least two of said transverse members each connected to at least one of said lateral members to form said frame structure;
at least a first and second support member connected transversely to at least one of said lateral members;
at least a third support member connected transversely to at least one other of said at least one lateral members,
said first, second and third support members oriented so as to stably support said frame structure on a surface,
said frame structure inclined to said surface at an angle ergonomically suitable for a user of the object supported on said frame structure.

In a variation of the present invention, the present invention is directed to a portable desk top frame structure for supporting an object comprising:

a plurality of lateral members;
a plurality of transverse members,
at least two of said transverse members each connected to at least one of said lateral members to form said frame structure;
at least a first and second support member connected transversely to at least one of said lateral members;
at least a third support member connected transversely to at least one other of said at least one lateral members,
said first and second support members oriented so as to stably support said frame structure on a surface,
said at least a third support member oriented in combination with said first and second support members to stably support said frame structure on another surface,

said frame structure inclined to said surface at an angle ergonomically suitable for a user of the object supported on said frame structure.

In the variation of the portable desk top frame structure, at least one of said first and second support members is oriented so as to stably su pport said frame structure on a surface comprises a wheel and axle assembly.

In another variation of the present invention, at least one of said first, second and third support members comprises at least one positionally adjustable joint for adjusting the position of said frame structure with respect to the surface.

In another variation of the present invention, at least one of said first, second and third support members comprises at least one positionally adjustable joint for adjusting the position of said frame structure with respect to the respective surface.

The frame structure can further comprise a covering material interfacing with at least a portion of said frame structure.

An alternate configuration of the first embodiment of the present inventi on comprises a portable desk top frame structure for supporting an object, with the frame structure comprising: a plurality of members connected in one of a (a) polygonal and (b) curvilinear arrangement to form the frame structure; at least one connection for a plurality of support members, with the at least one connection oriented to enable the plurality of support members to stably support the frame structure on at least one surface. The plurality of support members enable the frame structure to be inclined to the at least one surface at an angle ergonomically suitable for a user of the object to be supported on the frame structure.

In another alternate configuration, the frame structure comprises a plurality of members connected in at least one of a (a) polygonal and (b) curvilinear arrangement to form the frame structure; at least one connection for a plurality of support members, with the at least one connection oriented to enable at least one of the plurality of support members to stably support the frame structure on a first surface. The at least one connection is oriented to enable another of the plurality of support member to be oriented to stably support the frame structure on a second surface. The frame structure is inclined to the surface at an angle ergonomically suitable for a user of the object supported on the frame structure.

A second embodiment of the present invention is a portable desk top frame structure for supporting an object, the desk top frame structure being formed uniformly and integrally in at least one of a (a) polygonal and (b) curvilinear arrangement to form the frame structure. The desk top frame structure comprises: at least one connection for a plurality of support members, the at least one connection oriented to enable the plurality of support members to stably support the frame structure on at least one surface, the plurality of support members enabling the frame structure to be inclined to the at least one

surface at an angle ergonomically suitable for a user of the object to be supported on the frame structure.

In an alternate configuration of the second embodiment, the desk top frame structure is formed uniformly and integrally in one of a (a) polygonal and (b) curvilinear arrangement to form the frame structure. The desk top frame structure comprises: at least one connection for a plurality of support members, the at least one connection oriented to enable at least another of th e plurality of support members to stably support the frame structure on a first surface. The at least one connection is oriented to enable at least another support member to be oriented to stably support the frame structure on a second surface enabling the frame structure to be inclined to the surface at an angle ergonomically suitable for a user of the object supported on the frame structure.

At least one of the plurality of support members can comprise a wheel and axle assembly.

At least one of the plurality of support members can comprise at least one positionally adjustable joint for adjusting at least one of the (a) position of the frame structure with respect to at least one surface and (b) angle of the frame structure with respect to at least one surface.

In another variation of the portable desk top frame structure, at least another of the plurality of support members is oriented to enable the plurality of support members to stably support the frame structure on at least one surface are disposed to enable at least two users to be seated at least partially under the frame structure simultaneously.

The portable desk top frame structure can further comprise at least one member disposed so as to connect or join at least two portions of the frame structure.

The portable desk top frame structure can further comprise at least another member disposed so as to connect at least another portion of the frame structure, wherein at least another member and at least one member disposed so as to connect at least two portions of the frame structure are connected or joined to each other.

The portable desk top structure can further comprise a grating matrix formed uniformly and integrally with the frame structure, and can further comprise a covering material interfacing with at least a portion of the frame structure. The covering material can be disposed to interface also with the object to be supported.

At least one of the pluralityof support members of the portable desk top frame structure can further comprise a stabilizer bar. At least a portion of the stabilizer bar can be rotated to be at least partially parallel or be rotated circumferentially with respect to the plurality of support members. The stabilizer bar can further comprise at least one positionally adjustable joint for extending the span of the stabilizer bar.

The portable desk top frame structure can further comprise a raised surface enabling the user to ergonomically position an arm or wrist of the user. The raised surface can be integrally formed with the frame structure or the raised surface can be joined to the portable desk top frame structure by a joining means for joining the raised surface to the portable desk top structure.

The frame structure can further comprise connection means for connecting supporting means enabling support of the frame structure by one of (a) the body of a user and (b) a surface other than a floor on which a user is located. The connection means for connecting supporting means can comprise a strap-engaging means for engaging a strap.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevation view of the embodiment of the present invention of a portable adjustable desk.

FIG. **2** is a perspective view of the embodiment of the present invention of a portable adjustable desk.

FIG. **3** is a perspective view of a first alternate configuration of the embodiment of the present invention of a portable adjustable desk.

FIG. **4A** is an elevation view of a second alternate configuration of the embodiment of the present invention of a portable adjustable desk.

FIG. **4B** is an elevation view of a variation of the second alternate configuration of the present invention of a portable adjustable desk.

FIG. **5** is a variation of the embodiment of the present invention of a portable adjustable desk.

FIG. **6A** is an elevation view of a configuration of a covering for the desk top surface of the embodiment of the present invention of a portable adjustable desk.

FIG. **6B** is an elevation view of a variation of the covering for th e desk top surface of the embodiment of the present invention of a portable adjustable desk of FIG. 6A

FIG. **6C** is an elevation view of a second variation of the covering for the desk top surface of the embodiment of the present invention of a portable adju stable desk.

FIG. **7** is an elevation view of an alternate covering for the desk top surface of the embodiment of the present invention of a portable adjustable desk of the present invention.

FIG. **8** is an elevation view of the covering of FIG. 6A as coverin g the desk top surface of the embodiment of the present invention.

FIG. **9A** is a plan view of the first alternate configuration of a second embodiment of the present invention.

FIG. **9B** is a plan view as viewed from the bottom of the first alternate configuration of the second embodiment of the present invention of FIG. 9A.
FIG. **9C** is an elevation view as viewed from the side of the of first alternate configuration of the second embodiment of the present invention of FIG. 9A.
FIG. **9D** is an elevation view as viewed from the rear of the first alternate configuration of the second embodiment of the present invention of FIG. 9A.
FIG. **9E** is a perspective view of the first alternate configuration of the second embodiment of the present invention of FIG. 9A
FIG. **10A** is a plan view of the second alternate configuration of the second embodiment of the present invention.
FIG. **10B** is a plan view as viewed from the bottom of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
FIG. **10C** is an elevation view of a portion of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
FIG. **10D** is an elevation view of an alternate position of the portion of the second alternate configuration of the second embodiment of the present invention of FIG. **10A**.
FIG. **10E** is an elevation view as viewed from the side of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
FIG. **10F** is an elevation view as viewed from the rear of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
FIG. **10G** is a perspective view of the second alternate configuration of the second embodiment of the present invention of FIG. 10A.
FIG. **11A** is a plan view of a third alternate configuration of the second embodiment of the present invention.
FIG. **11B** is a plan view as viewed from the bottom of the third alternate configuration of the second embodiment of the present invention of FIG. **11A** .
FIG. **11C** is a perspective view of the third alternate configuration of the second embodiment of the present invention of FIG. **11A**
FIG. **11D** is a perspective view as viewed from the bottom of the third alternate configuration of the second embodiment of the present invention of FIG. **11C**.
FIG. **11E** is an elevation view as viewed from the rear of the third alternate configuration of the second embodiment of the present invention of FIG. **11A** .
FIG. **11F** is an exploded view of a portion of the third alternate configuration of the second embodiment of the present invention of FIG. **11A**.
FIG. **12A** is a perspective view of a third embodiment of the present invention.
FIG. **12B** is a perspective view of a detail of the third embodiment of the present invention of FIG. **12A.**
FIG. **12C** is perspective view of a detail of the third embodiment of the present invention of FIG. **12B**.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

FIG. **1** is a plan view of the upper surface of desk top frame structure **500** of the present invention with respect to an arbitrary set of xyz axes with the x and y axes forming a plane in the plan view and the z axis extends vertically perpendicular to the xy plane. The xy plane is inclined from the horizontal by an angle θ from the

horizontal as shown in FIG. 2. The angle θ is chosen to maximize ergonomic comfort. The desk top frame structure **500** comprises at least two members **510** and **512** parallel to the y direction. In the x direction, the members **520** and **522** are joined by a 4-sided cross connection **530** while members **524** and **526** are joined by tee connection **532**. The x-direction members **520** and **524** intersect with y-direction member **510** by means of tee connections **534** and **536** while members **522** and **526** intersect with y-direction member **512** by means of connections **538** and **540**.

Optional tee connection **538A** can be provided between tee connection **536** and member **510**, while optional tee connection **538B** can be provided between tee connection **540** and member **512**. The perpendicular connections of the optional tees **537A** and **537B** face in the z-direction toward the upper surface of the desk structure frame **500**, as shown by the perpendicular connections **537a** and **537b** of the tees **537A** and **537B**, respectively, which act as stopping mechanisms to minimize the chances that any item placed by the user on the desk top frame structure will slide off. A y-direction member **542** is connected to tee **544** which in turn is connected to tee **546**. Tee **546** is in turn connected to cross **530**. The perpendicular connections **544a** of tee **544** and **546a** of tee **546** are each oriented downward in the z direction. Connections **550** to tee **536** and connection **552** to tee **540** are shown as tees to provide optional capability to connect wheels and other accessories as shown and discussed later in FIGS **4A** and **4B**. However, those skilled in the art recognize that tee connections **550** and **552** can be substituted by elbows. The perpendicular connections **550a** of tee **550** and **552a** of tee **552** are in turn connected to one end of support members **554** and **556** respectively whose opposite ends can be in contact with a floor or the ground depending upon the user's desired usage of the device.

Tee connection **558** is connected to cross **530**. Tee connection **558** provides dual capability for connecting a third support member **560**. The third support member **560** can be oriented either by connection to the perpendicular connection **558a** of tee **558** or to the in-line connection **558b** of tee **558**.

Optional locking mechanisms **508** can be located at suitable locations as shown to strengthen the desk top frame structure **500**.

FIG. **2** is a perspective view of the desk top frame structure **500** of FIG. **1**. The identical component numbers are used and are not otherwise further described herein unless necessary. The only difference between FIG. **2** and FIG. **1** is that the third support member **560** is connected to an optional tee **562** at perpendicular connection **562a**. The orientation of tee **562** in the horizontal position as shown improves the stability of desk top frame structure **500**.

In FIG. **3** is illustrated an alternate configuration of the embodiment as shown in FIG. **1**. In this configuration, the third support member **560** and tee **562** are rearranged by removal from end **558a** of connecting tee **558** to connect instead to the end **558b** of the tee **558**. In this configuration, the user can comfortably place an object on the desk top surface **500** while in a vehicle or other confined space by resting the third support member **560** and as appropriate tee **562** on a suitable surface.

In FIG. **4A** is illustrated the alternate configuration of the embodiment of FIG. **3** further altered by removing the end tees **550** and **552** and the members **554** and **556**. Wheel axles **570A** and **570B** connecting wheels **572A** and **572B**, respectively, are attached to the end of tees **536** and **540** as shown. Optional additional locking mechanisms **508** can be attached to the tees **536** and **540** as shown. The third support member **560** now acts as handle which can be extended in length as necessary to enable a user to transport items located on the surface of the frame structure **500**.

FIG. **4B** is a variation of the alternate configuration of FIG. **4A** where the tees **550** and **552** remain in place and the connecting members **554** and **556** are just swiveled to an upright position to permit the wheels **572A** and **572B** to be connected now to the tees **554** and **556** through the wheel axles **570A** and **570B**. This configuration also enables a user to transport items located on the surface of the frame structure **500** without the necessity of storing the members **554** and **556** and the tees **550** and **552**.

In FIG. **5** is illustrated a sideways perspective view of the desk top frame structure **500** which is shown with respect to the arbitrary coordinate axes xyz as being inclined at an angle θ. That is, the xy plane is inclined to the horizontal by angle θ. The angle θ is chosen for ergonomic reasons and typically ranges from 30° to 45° but is not limited to this range. In a variation of the embodiment, the support member **811** is shown which comprises a plurality of members such as **820, 830, 840** and **845** which can be pivoted with respect to each other in the yz plane by means of the tighteners **825** and **835**. For example, the tightener **825** permits a pivot angle ϕ in the yz plane as shown between member **820** and member **830**. The member **820** can be connected by means of adjustable locking collar **850** to any of the connections **530, 546** or **544**. However, typically to obtain maximum support and stability of the item to be supported by the desk top frame, the locking collar **850** is connected either to the cross **530** or the tee **546**. This configuration enables the user to make additional adjustments to the orientation of the frame structure **500**. The member **840** can further comprise a telescoping member **845** to positionally adjust the position of the frame structure **500** with respect to the respective supporting surface. The telescoping member **845** can in turn can be constructed with a horizontal stabilizer bar **860**. The horizontal stabilizer bar **860** in turn can be comprised of two or more flaps **860A** and **860B** which pivot or rotate partially or completely upward and downward or circumferentially in a manner similar to the handles of a periscope. This pivoting or rotation facilitates storage of the telescoping member **845** and also adjustment of the frame structure **500** for use on uneven surfaces.

The support member **812** comprises a plurality of members such as **870, 880** and **885** which also can be pivoted with respect to each other by means of tighteners **865** and **875**. However, tightener **865** comprises a ball joint which allows motion in any direction whereas member **870** is connected to the desk top frame structure **500** by means of tightener **865** which permits pivoting in the yz plane as discussed above. Member **870** is connected to support member **880** by tightener **875** which also permits

pivoting in the yz plane. The member **885** is a telescoping member which is formed with the member **880**.

The third support member **813** which is primarily hidden also comprises a plurality of members in a similar manner which is obvious to those skilled in the art to be as shown and discussed for support member **812**.

FIGS. **6A, 6B** and **6C** illustrate alternate configurations of a covering which interfaces over the desk top frame structure **500**. In FIG. **6A** is a one-piece mesh suitably sized to span the dimensions outlined by members **510** and **512** and also by members **520, 522, 524** and **526**. In FIG. **6B** is a two-piece configuration of the mesh **610** divided into pieces **612A** and **612B** which are joined by hinges **614** located at sui table locations. In FIG. **6C** is four-piece configuration of the mesh **610** divided into four pieces **616A** to **616D**. Again, hinges **614** are placed at suitable locations. The mesh material can be made of any suitable material such as a metal or plastic. Those skilled in the art recognize that any number of divided pieces of mesh can be provided. The purpose of the multiple pieces of mesh is to enable a user to easily fold the mesh for transportation of the desk top structure.

FIG. **7** illustrates another covering **710** which can be used either alone or jointly with the mesh **610, 612A, 612B,** and **616A** to **616D** of FIGS. **6A** to **6C**. Covering **710** is a mesh permitting air flow to facilitate heat transfer when a laptop computer or other electronic device is located on the desk top frame structure **500**. Mesh covering **710** typically can include ULTRA GRIP LINER ™ made by the Con -Tact Corp.

FIG. **8** is an elevation view of the covering of FIG. **6A** as covering the desk top surface of the embodiment of the present invention. The mesh **612,** or **610, 612A, 612B** and **616A** to **616D** can be applied to the desktop frame structure **500** typically by fastening means such clips **810.** In addition, the covering **710** can be applied over the mesh also typically by fastening means such as clips **810.** The mesh coverings **612,** or **610, 612A, 612B** and **616A** to **616D** or **710** in addition provide a frictional surface to minimize or prevent sliding of the object placed on the desktop frame structure **500.** Typically, the object is a portable computer, but other objects as deemed suitable by the user can be accommodated also.

The embodiment has been described in terms of individual tees, crosses and members, suitable typically to be made of a plastic material to provide low weight, low cost and ease of assembly. In particular, as noted previously, the embodiment of FIGS. **1** through **8** is illustrated with two lateral or horizontal x-direction members and at least two transverse or vertical y-direction members to provide structural stability. That is, the x-direction members **520** and **524** intersect with y-direction member **510** by means of tee connections **534** and **536** while members **522** and **526** intersect with y-direction member **512** by means of connections **538** and **540**. Those skilled in the art recognize that there are other configurations possible that can provide structural stability, such as a polygonal arrangement or configuration, for example a quadrilateral or triangular

arrangement or configuration, or a curvilinear arrangement or configuration of the members in the x-y plane.

Those skilled in the art will recognize also that the present invention can be designed as in a unitary manner to provide uniform structures minimizing the number of connections and to provide smooth transitions.

In that regard, FIG. **9A** is a plan view of the first alternate configuration of a second embodiment of the present invention showing a uniform integrated structure of the portable desk **900** of the present invention. Such a structure is typically, but not limited to, formed by a manufacturing process such as injection molding of a lightweight plastic material. Suitable plastics include, but are not limited to, acrylonitrile-butadiene-styrene (ABS) and ethylene vinyl acetate (EVA). The portable desk **900** is comprised of a frame **902** having a louvered configuration of ventilation openings **904** formed by a grating or matrix **906.** The frame **902** has a front surface **924** and a rear surface **922.** The frame **902** typically is comprised of transverse or vertical cross members **902V** and lateral or horizontal cross members **902H** for structural integrity. Those skilled in the art recognize th at other arrangements or configurations of the frame **902** and cross members **902V** and **902H,** such as polygonal, for example, quadrilateral or triangular, or curvilinear arrangements or configurations in the x-y plane, can be provided as well to achieve struct ural integrity, or the frame **902** can be designed to exclude such cross members. At a position typically adjacent to the rear surface **922** preferably are at arm rest or wrist rest areas **908** on the left and right sides of the rear of the frame **902.** The arm rest areas **908** typically are formed by a raised surface to minimize user fatigue, and can be recessed to project edges **920.** The arm rest areas **908** and their optional edges **920** can be formed either integrally as part of the frame structure **902** or optionall y as a separate piece joined to the frame structure **902** at a joint such as joint **908J** which interfaces with the remainder of the frame structure **902.** The joining of the arm rest areas **908** to the remainder of the frame structure **902** at joint **908J** can be performed by well known means in the art such as by adhesion or mechanical joints. Right rear leg **910R** and left rear leg **910L** are positioned typically to provide stability during use. Each of the legs **910R** and **910R** are typically provided with foot pads **911R** and **911L.** A protrusion **912** at the front surface **924** is provided typically for at least one front leg **914.** The front leg typically includes a horizontal stabilizer connector base **916** and optionally extenders **918L** and **918R** to increase stability during u se. The optional extenders **918L** and **918R** can be, if desired, provided with optional telescoping extenders **918TL** and **918TR,** respectively, which permit the span of the extenders to be varied for further stability.

FIG. **9B** is a plan view as viewed from the bottom of the first alternate configuration of the second embodiment of the present invention of FIG. **9A.** Therefore, the view is reversed left-to-right as compared to FIG. **9A.** FIG. **9B** shows sockets or accessory attachment points which are an integral part of the frame **902.** In particular, attachment points or bosses **926L, 926R, 928L** and **928R** serve multiple purposes, some of which are discussed later. In this first alternate configuration, the attachment

points or bosses **926L** and **926R** are for legs **910L** and **910R**, respectively. At least a third attachment point **926M** is preferably provided to enable positioning of ***an accessory*** in the vicinity of the rear surface **922**, which is discussed later.. At least a third attachment point or boss **928M** is provided typically on the bottom side of the protrusion **912**. The attachment points or bosses **930A** through **930D**, in the vicinity of the rear surface **922**, and the attachment points or bosses **930E** and **930F**, in the vicinity of the front surface **924** are provided typically to enable storage or transport or packing of the accessories or the legs such as **910L, 910R, 910TL** and **910TR**. The accessories are discussed later with respect to FIGS. **10A -10G** and **11A-11F**.

In addition, attachment points or bosses **946a, 944a,** and **948a**. located near the center of the frame **902**, typically on the vertical member **902V** or at or near an intersection point between the vertical member **902V** and the horizontal position, permit a user to position a handle as close to the effective center of gravity of the frame **902** as possible. The effective center of gravity results from the combined weight and load distribution of the desk **900** and a typical load such as a portable computer. The attachment points or bosses **946a** and **944a** are analogous in function to the attachment points or bosses **546a** and **544a** of FIGS. **1** through **4A** of the first embodiment.

FIG. **9C** is an elevation view as viewed from the side of the of first alternate configuration of the second embodiment of the present invention of FIG. **9A**. In particular, the frame **902** is shown with the right rear leg **910R** and foot **911R** while the protrusion **912** is positioned on the front surface **924.** The raised surface of the arm rest or wrist rest **908** with the edge **920** is positioned in the vici nity of the rear surface **922.** In this case, an optional telescoping front leg portion **914T** is provided as part of front leg **914.** The connector base **916** and optional extenders **918L** and **918R** preferably have a circular or oval cross-section. In general, any one or all of the legs **910R, 910L** and **914** can be provided with telescoping portions such as telescoping portion **914T.**

FIG. **9D** is an elevation view as viewed from the rear of the first alternate configuration of the second embodiment of the present invention of FIG. **9A.** In particular, FIG. **9D** illustrates the connector base **916** and optional extenders **918L** and **918R.**

Similarly, FIG. **9E** is a perspective view of the first alternate configuration of the second embodiment of the present invention of FIG. **9A.** Since all of the components are numbered identically as in FIGS. **9A** and **9B**, no additional discussion is provided here.

The second embodiment of the present invention as illustrated in FIGS. **9A** through **9E** show the portable desk of the first embodiment of FIGS. **1** through **8** formed in a unitary integral manner. In addition, the screen mesh **610** of FIG. **6A,** the screen mesh **612A** and **612B** of FIG. **6C,** the screen mesh **616A** through **616D** of FIG. **6C** can be applied as well on top of the grating or matrix **906** using the clips as would be obvious

to those skilled in the art and as illustrated in FIG. **8**. Similarly, the covering **710** can be applied as well using the same method illustrated in FIG. **8**.

FIG. **10A** is a plan view of the second alternate configuration of the second embodiment of the present invention. The main difference between the first and second alternate configurations of the second embodiment is that in the second alternate configuration, the frame **902** is now in a transport mode enabled by wheels **940L** and **940R**. The wheels **940L** and **940R** are connected by axle portions **938L** and **938R** and to axle connecting members **936L** and **936R**. The axle members are discussed in more detail with respect to FIG. **10B** which follows. The transport mode is further enabled in that the front leg **914** and the optional telescoping portion of the front leg **914** are now directed in the same plane as the frame **902** by means of a tee connection **934** in the protrusion area **912**. The connector **916**, which is connected to the front leg **914** or the optional telescoping portion of the front leg **914**, acts as a handle for the user, thereby facilitating transport of the desktop **900** and the object such as a portable computer (not shown).

FIG. **10B** is a plan view as viewed from the bottom of the second alternate configuration of the second embodiment of the present invention of FIG. **10A**. The wheels **940L** and **940R** can be seen connected by axle members **938L** and **938R** to axle joints **936L** and **936R**. In turn, axle members **942L** and **942R** are also connected respectively to the axle joints **936L** and **936R** and are commonly connected to the central axle joint **936M**. Of course, those skilled in the art recognize that different combinations or quantities of axle joints and connectors can be used as well. The tee connection **934** is shown with the projection of the tee accommodating the front leg **914** which, as noted previously, acts as a handle for transport, together with the telescoping portion **914T** and handle **916**, as discussed previously.

FIG. **10C** is an elevation view of a portion of the second alternate configuration of the second embodiment of the present invention of FIG. **10A**. In particular, FIG. **10C** shows the wheel and axle members **940L, 938L, 936L, 942L, 936M, 942R, 936R, 938R** and **940R**, as being separated from the frame **902**.

FIG. **10D** is an elevation view of an alternate position of the portion of the second alternate configuration of the second embodiment of the present invention of FIG. **10A**. In particular, FIG. **10D** shows the wheels **940L** and **940R** separated from the axle members **936L, 942L, 936M, 942R** and **936R**. The axle connectors **936L, 936M** and **936R** each have attachment points **936PL, 936PM** and **936PR**, respectively for attachment of the axle connector and members to the frame **902**.

FIG. **10E** is an elevation view as viewed from the side of the second alternate configuration of the second embodiment of the present invention of FIG. **10A**. In particular, the tee ??? connection **934** is shown connecting the front leg **914**, which acts as a handle for transport, together with the telescoping portion **914T** and handle **916**, at the front protrusion **912** so as to accommodate the frame **902**.

FIG. **10F** is an elevation view as viewed from the rear of the second alternate configuration of the second embodiment of the present inv ention of FIG. **10A**. In particular, FIG. **10F** shows the wheel and axle members **940L, 938L, 936L, 942L, 936M, 942R, 936R, 938R** and **940R** from the rear surface **922.**

FIG. **10G** is a perspective view of the second alternate configuration of the second embodiment of the present invention of FIG. **10A** . All of the members are as previously identified in the discussion for FIGS. **10A** through **10F**, and will not be discussed further here.

FIG. **11A** is a plan view of a third alternate configuration of the second embodiment of the present invention.. In particular, the third alternate configuration enables a "2-wide" arrangement where two users can be sitting adjacent to each other while using the desktop **900.** The only difference between the third alternate configuration and the first and second alternate configurations is that in the third alternate or "2 -wide" configuration, the frame **902** is supported by the front leg **914** and optional telescoping portion **914T** in the perpendicular or vertical position, as in the first alternate configuration of FIGS. **9A** through **9E**, while the axle connectors and members **936L, 942L, 936M, 942R** and **936R** are positioned without the wheels **940L** and **940R,** and the wheel connectors **938L** and **938R,** respectively. Horizontal extending elements **944L** and **944R** are now connected respectively to the connectors **936L** and **936R** so as to provide sufficient room for the two users to be seated each partially underneath the frame **902** of the desktop **900.** The left and right legs **910L** and **910R,** and the corresponding base feet **911L** and **911R,** respectively, are now connected to the horizontal extending elements **944L** and **944R** by means of connecting elbows **946L** and **946R,** respectively.

FIG. **11B** is a plan view as viewed from the bottom of the third alternate configuratio n of the second embodiment of the present invention of FIG. **11A.** In particular, FIG. **11B** shows the axle connectors and members **936L, 942L, 936M, 942R** and **936R** positioned across the bottom surface of the frame **902** without the wheels **940L** and **940R,** and the wheel connectors **938L** and **938R,** respectively. As noted previously, the left and right legs **910L** and **910R,** and the corresponding base feet **911L** and **911R,** respectively, are now connected to the horizontal extending elements **944L** and **944R** by means of connecting elbows **946L** and **946R,** respectively.

FIG. **11C** is a perspective view of the third alternate configuration of the second embodiment of the present invention of FIG. **11A** . In particular, FIG. **11C** shows the span from left leg **910L** to right leg **910R.** All of the remaining components shown are the same as in FIG. **11A** and **11B.**

FIG. **11D** is a perspective view as viewed from the bottom of the third alternate configuration of the second embodiment of the present invention of FIG. **11C** . FIG. **11D** shows the same components as FIGS. **11A** through **11C.**

FIG. **11E** is an elevation view as viewed from the rear of the third alternate configuration of the second embodiment of the present invention of FIG. **11A**. In particular, FIG. **11E** shows the view from the rear surface **922** of the "2 -wide" configuration. The components are the same as shown in FIGS. **11A** through **11D**.

FIG. **11F** is an exploded view of a portion of the third alternate configuration of the second embodiment of the present invention of FIG. **11A**. Specifically, FIG. **11F** shows the axle connectors and members **936L, 942L, 936M, 942R** and **936R,** the left and right legs **910L** and **910R,** and the corresponding base feet **911L** and **911R,** respectively, connected to the horizontal extending elements **944L** and **944R** by means of connecting elbows **946L** and **946R,** respectively. All of these components are shown in exploded form. The axle portion comprises the axle connectors and members **936L, 942L, 936M, 942R** and **936R.**

As is the case for the first alternate configuration of FIGS. **9A** through **9E,** for the second alternate configuration and the third alternate configuration of FIGS. **10A** through **10G** and FIGS. **11A** through **11F,** the screen mesh **610** of FIG. **6A,** the screen mesh **612A** and **612B** of FIG. **6C,** the screen mesh **616A** through **616D** of FIG . **6C** can be applied as well on top of the grating or matrix **906** using the clips as would be obvious to those skilled in the art and as illustrated in FIG. **8**. Similarly, the covering **710** can be applied as well using the same method illustrated in FIG. **8.**

A fourth alternate configuration suitable for situations such as where the user is seated in a confined space such as an automobile and desires to rest the front leg **914** and optional telescoping portion **914T** and handle **916** on the top of a flat surface is seated partially under the frame **902** can be provided. The fourth alternate configuration is analogous to the configuration of FIG. **3.** Again the screen mesh can be applied as discussed previously.

FIG. **12A** is a perspective view of a third embodiment of the present invention. The desk top frame structure **902** is the same as that illustrated in FIG. **9A** through **11D** previously and so some of the details are being omitted from the discussion as having already been discussed previously. FIG. **12B** is a perspective view of a detail of the third embodiment of the present invention of FIG. **12A.**

Referring to both FIGS. **12A** and **12B,** the difference is now that, in addition to the axle joints **936L, 936M** and **936R** and axle members **942L** and **942R,** the desk top frame structure **902** is now provided with additional joints **948L** and **948R** which are joined to an axle member **948.** The joints **948L** and **948R** each include attachment points **948PL** and **948PR** which enable attachment to the frame structure at attachment points or bosses **928L** and **928R** of FIG. **9B**. Similarly, the joints **936L, 936M** and **936R** are attached to the attachment points or bosses **926L** and **926R** of FIG. **9B.**

The purpose of the third embodiment is to enable a user to support the frame structure **902** by the user's own body typically from his or her shoulders typically while

standing by means of shoulder straps (not shown) or from a surface that is at least above the user's mid-section or typically above the user's head typically while standing that is other than the floor on which the user is located . Therefore, the joints **948L** and **948R** and the joints **936L** and **936R** are now provided with support el bows **950FR, 950FL, 950RL** and **950RR,** respectively. Each of the support elbows **950FR, 950FL, 950RL** and **950RR** includes a ring or ot her engagement means **952FR, 952FL, 952RL** and **952RR,** respectively, to enable attachment of the shoulder straps or other support means to enable the user to support an object on top of the frame structure **902** without directly relying on the floor for support.

FIG. **12C** is perspective view of a detail of the third embodiment of the present invention of FIG. **12B**, and shows in detail the support elbows **950FR, 950FL, 950RL** and **950RR** including the ring or other engagement means **952FR, 952FL, 952RL** and **952RR,** respectively. Those skilled in the art recognize that there are numerous connection means or engagement means to supporting mechanisms that enable support of the desk top frame structure without directly relying on the floor for support. These include but are not limited to male and female type connections, either threaded or unthreaded as examples.

The invention has now been explained with reference to specific embodiments. Other embodiments will be apparent to those of ordinary skill in the art in view of the foregoing description. It is not intended that this invention be limited except as indicated by the appended claims and their full scope equivalents.